CLAIMS

What is claimed is:

1. An optical transmitter comprising:

an array having at least one semiconductor laser;

a memory for storing drive waveform parameters; and

a driver circuit, coupled to the memory and the array, for receiving data signals and at least one drive waveform parameter, and responsive thereto, for generating at least one drive waveform to drive the semiconductor laser;

wherein the driver circuit updates at least one drive waveform parameter during the operation of the transmitter based on one of an aging factor of the array and a temperature factor of the array and generates an updated drive waveform based on the updated drive waveform parameter.

2. The optical transmitter of claim 1 wherein the array includes a plurality of semiconductor lasers; and

wherein the driver circuit individually programs the drive waveform parameters for each semiconductor laser to increase the uniformity in the resulting optical waveforms of the semiconductor lasers.

3. The optical transmitter of claim 2 wherein the driver circuit individually determines the dc properties for each semiconductor laser in the array, individually determines the ac properties for each semiconductor laser in the array; and generates a drive waveform for each semiconductor laser based on the dc properties and ac properties for that semiconductor laser.

4. The optical transmitter of claim 1 wherein the driver circuit includes an integrated digital controller and a temperature sensor for sensing the temperature of the driver circuit; and wherein the integrated digital controller selectively updates the drive waveform parameters based on the temperature of the driver circuit.

5. The optical transmitter of claim 1 wherein the driver circuit includes an integrated digital controller having a timer function for periodically adjusting at

least one drive waveform parameter to compensate for aging of the semiconductor laser.

6. The optical transmitter of claim 1 wherein the array includes a 1 x N array of semiconductor lasers.

7. The optical transmitter of claim 6 wherein the semiconductor laser is a vertical cavity surface emitting laser (VCSEL).

8. The optical transmitter of claim 1 wherein the memory includes a nonvolatile memory for storing one of bias current parameter, modulation current parameter, negative peaking depth parameter, and negative peaking duration parameter for each semiconductor laser in the array.

9. A laser driver for generating drive waveforms that drives an array having at least one semiconductor laser comprising:

a digital controller integrated with the laser driver;

wherein the digital controller initially programs and selectively adjusts during the operation of the driver at least one parameter associated with the drive waveform.

10. The laser driver of claim 9 further comprising:

an aging compensation mechanism for monitoring the age of the laser and for selectively adjusting at least one parameter of the drive waveform to compensate for the aging of the laser.

11. The laser driver of claim 9 further comprising:

a temperature compensation mechanism for monitoring the temperature of the driver driver and selectively adjusting at least one parameter of the drive waveform to compensate for the changes in temperature.

12. The laser driver of claim 9 wherein the laser driver

is suitable for driving a single vertical cavity surface emitting laser (VCSEL) or an array of vertical cavity surface emitting lasers (VCSELs).

13. The laser driver of claim 9 wherein the drive waveform parameters includes at least one dc parameter and at least one ac parameter.

14. The laser driver of claim 9 wherein the parameters associated with the drive waveform include one of

bias current, modulation current, negative peaking depth, and negative peaking duration.

15. The laser driver of claim 9 further comprising:

a storage for storing drive waveform parameters;

a digital to analog converter for receiving the drive waveform parameters in digital form and responsive thereto for generating the drive waveform parameters in analog form; and

a waveform shaping circuit for receiving the drive waveform parameters in analog form and responsive thereto for generating a drive waveform that is dependent on the drive waveform parameters.

16. A method for providing a drive waveform for at least one semiconductor laser in a laser driver having an integrated controller and a storage for storing drive waveform parameters, the method comprising the steps of:

initially setting at least one drive waveform parameter; and

adjusting the drive waveform parameter during the operation of the laser driver based on one of a temperature factor and an aging factor.

17. The method of claim 16 wherein the drive waveform parameters in the storage are organized by laser, temperature factor, and age factor; and wherein adjusting the parameter during the operation of the laser driver includes retrieving at least one updated drive waveform parameter from the storage based on the operating temperature of the semiconductor laser.

18. The method of claim 16 wherein the drive waveform parameters in the storage are organized by laser, temperature factor, and age factor; and wherein adjusting the parameter during the operation of the laser driver includes periodically retrieving at least one updated drive waveform parameter from the storage based on the age of the semiconductor laser.

19. The method of claim 16 wherein initially setting at least one drive waveform parameter includes one of:

digital programming of a bias current;

digital programming of a modulation current;

digital programming of a negative peaking depth on a drive waveform during an optical one to optical zero transition; and

digital programming of a negative peaking duration on a drive waveform during an optical one to optical zero transition.

20. The method of claim 16 wherein adjusting at least one drive waveform parameter includes one of:

digital programming of an updated bias current;

digital programming of an updated modulation current;

digital programming of an updated negative peaking depth on a drive waveform during an optical one to optical zero transition; and

digital programming of an updated negative peaking duration on a drive waveform during an optical one to optical zero transition.